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NOTES ON THE MARINE BIOLOGICAL
LABORATORIES OF EUROPE.BY BASHFORD DEAN,
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PART II.

NAPLES.

The Stazione Zoologica at Naples during the past twenty years has earned its reputation as the center of marine biological work. Its success has been aided by the richness of the fauna of the Gulf, but is due in no small degree to careful and energetic administration. The director of the station, Prof. Dohrn, deserves no little gratitude from every worker in science for his untiring efforts in securing its foundation and systematic management. Partly by his private generosity and partly by the financial support he obtained, the original, or eastern building was constructed. Its annual maintenance was next assured by the aid he secured throughout (mainly) Germany and Austria. By the leasing of work tables to be used by representatives of the universities, a sufficient income was maintained to carry on the work of the station most efficiently. A gift by the German government of a small steam launch added not a little to the collecting facilities.

Attractiveness is one of the striking features of the Naples station. It has nothing of the dusty, uncomfortable, gloomy air of the average university laboratory. Its situation is one of the brightest; it has the gulf directly in front, about it the city gardens, rich in palm trees and holm oaks. The building itself rises out of beds of century plant and cactus, like a white palace; the fashionable drive-way alone separates it from the water's edge. In full view is the Island of Capri, to the eastward is Vesuvius,—a bright and restful picture to one who leaves his work for a five minutes stroll on the long, covered balcony which looks out over the sea.

The student, in fact, knows the Naples station before he visits it, although he can hardly anticipate the busy and profitable stay that there awaits him. He has received the circular from the Secretary of the laboratory while perhaps in Germany, when he secured the privilege of a table. He is told of the best method of reaching Naples, the precautions he must take to secure the safe arrival of his boxes and instruments. He is told to send directions as to the material he desires for study; he is notified of the supplies which will be allowed him, and of the matters of hotels, lodging and bank-

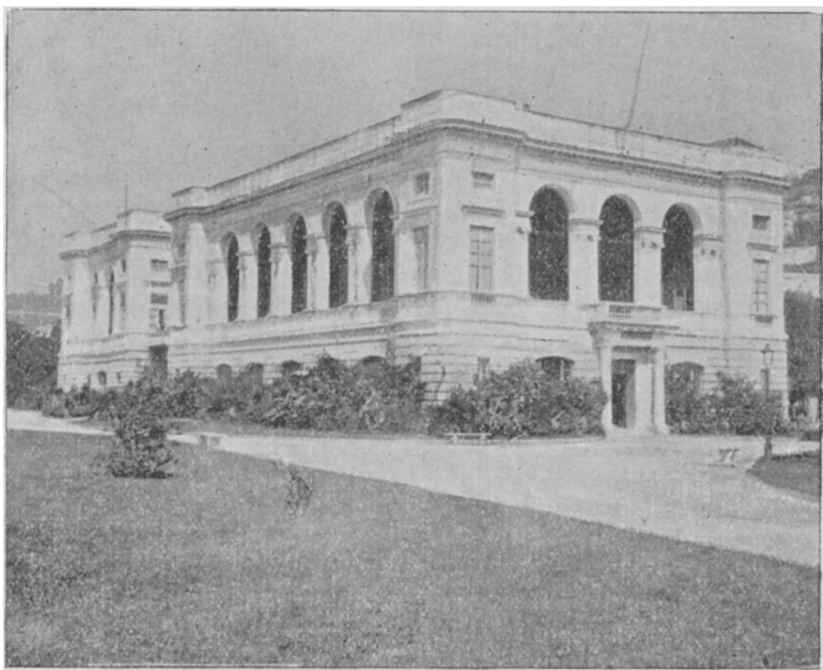


FIG. 1.

Stazione Zoologica of Naples. From view taken by writer, June, 1891.

ing, necessary even to a biologist. At the first sight of the building he is impressed most favorably, and it is not long before he comes to look upon his work-place as his particular home, open to him day, night and holidays. He likes the general air of quietness,—in no little way significant of system in every branch of the station's organization; his neighbors are

friendly and he feels that even the attendants are willing, often anxious to give him help.

At present the station at Naples consists of two buildings; the first shown in the foreground in the accompanying figure (Fig. 1), is the older, the main building, behind it is the newly built physiological laboratory. In the basement of the main building is the aquarium, well managed, open to the public, and eagerly visited. Passing into the aquarium room from the main entrance, one descends into a long, dark, concreted room, lighted only through wall-tanks brilliant on every side with the varied forms of life. There are in all about two dozen large aquaria embedded in the walls of the sides and of the main partition of the room. The water is clear and blue. The background in each aquaria, built of rock work, catches the light from above and throws in clear relief the living inmates. The first tank will perhaps be full of star fish and sea urchins, bright in color, often clustered on the glass each with a dim halo of pale, threadlike feet. In the background may be a living clump of crinoids, flowering out like a garden of bright colored lilies. In a neighboring tank, rich with dark colored seaweeds, will be a group of flying gurnards, reddish and brilliantly spotted, feeling cautiously along the bottom with the finger-like rays of their wing-shaped fins. Here too may be squids, delicate and fish-like, swimming timidly up and down; perhaps a series of huge triton snails below amid clustered eggs of cuttle fish. In another tank would be a bank of sea anemones with all the large and brilliant forms common to southern waters. Here may be corals in the background and a forest of sea fans in orange, red and yellow, with a precious fringe of pink coral, flowering out in yellow starlike polyps. There may again be a host of ascidians, delicate, transparent, solitary forms, the lanky *Ciona*, the brilliantly crimson *Cynthia* and huge masses of varied, compound forms. Swimming in the water may be chains of *Salpa* and occasionally a number of *Amphioxus*, the latter, as they from time to time emerge from the sandy bottom, flurry about as if with sudden fright, quickly to disappear. Variety is one of the striking characters of neighboring tanks. In one, brilliant forms will outvie the

colors of their neighbors, in another, the least obtrusive mimicry will be exemplified. The stranger has often to examine carefully before, in the seemingly empty tank, he can determine on every side the living forms whose color characters screen them effectively. Thus he will see sand-colored rays and flounders, the upturned eyes of the curious star-gazer almost buried in the sand, a series of mottled crustaceans wedged in a rocky background, an occasional crab wandering cautiously about, carrying a protective garden of seaweeds on his broad back; odd sea horses posing motionless, mimicing the rough stems of the seaweeds. In the larger tank sea turtles float sluggishly about; and coiled amid broken earthen jars, are the sharp-jawed murrays, suggestive of Roman diners and of the cultural experiments of Pollio. Aëration in the aquaria is secured effectively by streams of air which are forced in at the water surface and subdivide into bright clouds of minute silvery bubbles. The tanks are cared for from the rear passage-ways; attendants are never seen by visitors and constant attention has given the aquaria a well earned reputation. Descriptive catalogues with figures enable the stranger to better appreciate the aquarium.

To the remainder of the building strangers are not admitted. A marble stairway leads from the door of the aquarium to a loggia which opens into the territory of the students. A long pathway of grating extends across the open center of the building,—whose skylight top admits the light to the aquarium below. On the one hand is the main laboratory room, on the other the library and separate rooms intended for more fortunate investigators. One enters the main laboratory, passes a wall of student aquaria and sees a series of alcoves formed by low partitions, each work place with its occupant, his apparatus, his books, his jars,—altogether often a picture not of the utmost tidiness. A small iron staircase leads to a gallery which gives a second tier of work places and doubles the working capacity of the room. Here, side by side, will be representative workers from universities of every country of Europe.

The library room adds not a little to the attractiveness of the Naples station. It is a long room, and, as shown in

(Fig. 2), is adorned with frescoes in a truly Italian style. It looks out into a long loggia with view of the sea and Capri, where the student is wont to promenade or retire in after lucheon hour with easy chair and book. The working library is of the best and is sure to contain the results of



FIG. 2.

Naples. Corner of north end of Library : Photographed by writer, May, 1891.

the most recent researches. The desk shown in the figure is one on which each day is to be found the latest publications. In the upper pigeon holes are the cards prepared for each investigator on his advent to Naples ; with these he replaces the volumes which he has taken to his work place. Every

division of the laboratory is carefully organized and is under the charge of a special assistant. Prof. Hugo Eisig, the assistant director, has taken the welfare of each student under his personal charge, and it is not until the end of his stay that the visitor recognizes how much has been done for him.

There is no more interesting department of the station than that of receiving and distributing the material. Its headquarters is in the basement of the physiological laboratory, and here Cav. Lo Bianco is to be found busy with his aids and attendants amid a confusion of pans, dishes and tables, encountering the Neapolitan fishermen who have learned to bring all of their rarities to the station. The specimens are quickly assorted by the attendants; such as may not be needed for the immediate use of the investigators are retained and prepared for shipment to the universities throughout Europe. The methods of killing and preserving marine forms have been made a most careful study by Lo Bianco and his preparations have gained him a world wide reputation. Delicate jelly fish are to be preserved distended, and the frail forms of almost every group have been successfully fixed. The methods of the Naples station were kept secret only until it was possible to verify and improve them as it was not deemed desirable to have them given out in a scattered way by a number of investigators.

Lo Bianco has made the best use of the rich material passing daily through his department, and has been enabled to prepare the most valuable records as to spawning seasons and as to larval conditions. He knows the exact station of the rarest species, and it seems to the stranger a difficult matter to ask for a form which cannot be directly or indirectly procured. It adds no little to the time saving of the student to find each morning at his work place, the fresh material which he has ordered the day before, and there is usually an embarrassment rather than a dearth of riches.

A collecting trip often occurs as a pleasant change from the indoor work of the investigator. An excursion to Capri may be planned; the launch will be brought to the quay near the station and the party will embark. The collecting tubs are

soon scattered over the deck and filled with the dredge contents. Some of the passengers are quickly at work sorting out their material, this one seizing brachiopods, another compound ascidians, another sponges. Others will wait until the surface nets have been brought in and the contents turned into jars. All will depend upon Lo Bianco as an appellate judge in matters of identification.

Many Americans have availed themselves of the privileges of Naples and the former lack of support of an American table needs little comment. Of those who have hitherto visited Naples not less than three-quarters have been indebted to the courtesies of German universities. At present, of the two American tables, one is supported by the Smithsonian Institution, the other by gift of Mr. Agassiz.

The entire Italian coast is so rich in its fauna that it is due perhaps, only to the greatness of Naples, that so few stations have been founded. Messina has its interesting laboratory well known in the work of its director, Prof. Kleinenberg. The Adriatic, especially favorable for collecting, has at Istria a small station on the Dalmatian coast, and at Trieste is the Austrian station.

TRIESTE.

Trieste possesses one of the oldest and most honored of Marine Observatories, although its station is but small in comparison with that of Naples, Plymouth or Roscoff. Its work has in no small way been limited by scanty income; it has offered the investigator fewer advantages and has therefore become outrivalled. During a greater part of the year it is but little more than the supply station of the University of Vienna, providing fresh material for the students of Professor Claus. Its percentage of foreign investigators appears small; its visitors are usually from Vienna and of its university.

Trieste is in itself a small but busy city, growing in active commerce. Its quays are massive and bristle with odd shaped shipping of the Eastern Mediterranean. Its deep and basin like harbor affords a collecting ground as rich as the Gulf of Naples.

The station has been located at a quiet corner of the harbor, just beyond the ledge of the lighthouse. Its building is somewhat chalet-like, situated on a small, well wooded knoll, as seen in the adjacent figure (Fig. 3). About it are trellis covered grounds enclosed by high walls, and separated from the harbor only by the main roadway of the quays. One enters the laboratory garden through a large gateway and passes into a



Fig. 3.

Marine Station at Trieste.

From photograph received recently from Dr. Graeffe.

court yard whose outhouses disclose the pails and nets of the marine laboratory. Perhaps an attendant will here be sorting out the captures which a bronze-legged fisherman has just brought in.

A library and the rooms of the director, Dr. Graeffe, are close by the entrance of the building. In the basement is the aquarium room.—somewhat dark and cellar like; its tanks

small and shallow, their inmates representing especially stages of Adriatic hydroids and anthozoans. On the second story are the investigators' rooms, large, well lighted, looking out over garden and sea. Near by is a museum of local fauna, rich in crustaceans and in the larval stages of Adriatic fishes.

GERMANY, NORWAY, RUSSIA.

The German universities have contributed to such a degree to the building up of the station at Naples that they have hitherto been little able to avail themselves of the more convenient but less favorable region of German coasts. The collecting resources of the North Sea and of the Baltic have perhaps been not sufficiently rich to warrant the establishment of a central station. On the side of the Baltic, the University of Kiel, directly on the coast, may itself be regarded a marine station. At present the interest in founding local marine laboratories has, however, become stronger. At Plön, at a corner of the North Sea not far from Flensburg, is established a small station under the directorship of Professor Zacharias,—and the first number of its contributions has recently been published. In addition the newly acquired Heligoland has become the seat of a well equipped Governmental station, under the directorship of Dr. R. Heincke. The island has been long known as most favorable in collecting regions, and its position in the midst of the North Sea fisheries gives it especial importance.

Norway like Germany is strengthening its interest in local marine laboratories. During the past year (1892) it has succeeded in establishing two permanent stations, one near Bergen,—the other south of Bergen an outjutting point of the North Sea almost westward of Christiana. The former is interested especially in matters relating to the North Sea fisheries, and is supported partly by the contributions of a learned society and partly by a subsidy from the government in view of its relation to the practical fisheries. The second and smaller station is devoted almost exclusively to research in morphology. It is a dependency of the University of Christiana and is under the directorship of one of its professors, Dr. Johan Hjört.

With the richest collecting resources these new stations may naturally be expected to yield most important results.

Russians have ever been most enthusiastic in marine research, and their investigators are to be found in nearly every marine station of Europe. The French laboratory on the Mediterranean at Ville Franche, as has previously been noted, is supported essentially by Russians. At Naples they are often next in numbers to the Germans and Austrians. The learned societies of Moscow and St. Petersburg have contributed in no little way to marine research. The station at Sebastopol on the Black Sea, has become permanent, possessing an assured income. That near the Convent Solovetsky on the White Sea, though small, is of marked importance. It is already in its thirteenth year. Professor Wagner of St. Petersburg, has been its most earnest promoter as well as constant visitor. He in fact caused the Superior of the Convent to become interested in its work and secured a permanent building by the Convent's grant; he was then enabled by an appropriation from government to provide an equipment. Its annual maintenance is due to the Society of Naturalists of St. Petersburg. The matter of the appointment of a permanent director for the summer months is now being agitated. The station Solovetskaia is said to possess the richest collecting region of the Russian coasts. It is certainly the only laboratory which has at its command a truly Arctic fauna.

The following list of papers relating to marine laboratories was kindly sent the writer from Naples by Mr. H. B. Pollard.

Arcachon (Bulletin of the Scientific Society.)

Berichte v. d. Ver der. biol. Stat. Sebastopol. Russian text.

Brunchorst, Die biol. Meerestat. 1st. Bergen. Plate and plans.

Buisson, Les Stations Zool. du Bords de la Mer. Rev. de Ques. Scien. Brussels, 1889.

Dohrn, Aus Vergang. u. Gegenwart der Zool. Stat. in Neapel, Deutsche Rundschau, XVIII, h. II, Pachtel, Berlin, 1892.

Faussek, Station biologique "Solovetskaia." (1892.)

Herdman, Annual reports of Liverpool M. B. Station on

Puffin Island. Dobb & Co., Liverpool, 1890-91.

Hoyle, Scot. M. Stat. and its work. J. of M. B. Ass. II.

Korotheba, (The laboratory at Ville Franche, Russian text.) Cracow, 1892.

Lacaze Duthiers, Les Lab. maritimes de Roscoff et Banyuls en 1891. Rev. Exp. de Biol. 1892.

Les Stations Zoologiques, L' Aquarium des Sables d' Olonne, La Nature, 16 Année, 1 sem. 1891.

McIntosh, St. Andrew's Marine Laboratory. J. of M. B. Ass. II.

Mitsukeori, The Mar. Biol. Stat. of the Imp. Univ. at Misaki, J. of Col. of Scien. of Japan. Tokio. V. I.

Nederlandische Dierkundige Vereeniging Zool. Stat.

Tijdschr. d. Ned. Dier. Ver., with figure, 1890.

Petersen, Danske Biol. Stat. Rep. Copenhagen Schule. 1892.

Pouchet, Rapport. sur la Laboratoire de Concarneau, 1886.

Prince, St. Andrew's Mar. Lab. Eng. Ill. Mag. p. 70. 1889.

Vogt, Les Laboratoires de Zoologie maritimes, Rev. Scient. Paris, 1876.

Vogt, Zool. Stat. Die Gegenwart. 26 Bd. 1884.

Von Lendenfeld, Die Zool. Stat. in Trieste.

Oes. Ung. Revue, 7 Bd. 1889.

Zacharias, Forschungsberichte aus der Biol. Stat. zu Plön, Friedländer, Berlin, 1893.

Since the above was in print, Prof. Lönnberg has given the writer many interesting details in regard to the Swedish Zoological Station on the west coast near the city of Gothenberg.

The Station has up to the present, under its founder and late director, Prof. Loven, admitted no foreigners.

Its three original buildings, a laboratory and two dwelling houses, were constructed about fifteen years ago by a gift of Dr. Regnell of Stockholm. It is at present maintained by a small subsidy from the government. Dr. Hjalmar Theel, in charge of the museum at Stockholm, has recently been appointed its director. The laboratory is itself a wooden building, with aquaria rooms, and on the second story with the separate work places of the investigators. The students are mainly from the University of Upsala.